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Design and *in vivo* Validations of Nanosystems in Cardiovascular Tissue Engineering and Molecular Imaging

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This presentation intends to present polysaccharide-based matrices for regenerative medicine and as drug delivery systems and targeted contrast agents for molecular imaging with an emphasis on cardiovascular pathologies.

We will present examples of innovative nano medical imaging tools. In the context of atherothrombotic diseases, there is a need for new approaches for early diagnosis and improved therapies. This is the focus of NanoAthero, an European large scale project, started in February 2013. The aim is to demonstrate that nanotechnologies can be developed and clinically proven to be effective in tackling cardiovascular diseases. The NanoAthero consortium is a unique opportunity to extend the frontiers of knowledge on atherothrombosis management. NanoAthero aims to demonstrate the preliminary clinical feasibility of the use of nanosystems for targeted imaging and treatment of advanced atherothrombotic disease in humans. NanoAthero combines in-depth knowledge of nanocarrier bioengineering and production with state-of-the-art expertise in imaging and treatment of cardiovascular patients providing a full framework of 16 partners within one collaborative European consortium (16 partners from 10 countries - see <http://www.nanoathero.eu/>).

We will also present how to use nanomaterials for regenerative medicine. Indeed, adhesion by aqueous nanoparticle solutions can be used *in vivo* in rats to achieve rapid and strong closure and healing of deep wounds in skin and liver. Nanoparticles can also be used to fix polymer membranes to tissues even in the presence of blood flow, such as occurring after liver resection, yielding permanent hemostasis within a minute. Furthermore, medical devices and tissue engineering constructs could be fixed to organs such as a beating heart.

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